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not lay so much stress as many recent writers have done upon the claims for extensive pleomorphism and variability among bacteria, and seems not to be acquainted with some of the available data in this field.

The index of the book is somewhat inadequate for a compilation of this character, and might be enlarged to advantage. The most serious typographical error that we have noticed is the mistake in numbering and placing Plates IV and V, so that each plate is faced by the description of the other. But when all shortcomings are taken into consideration, it still remains true that Dr. Migula's work is a distinct aid to all workers in bacteriology, and should give an impetus to the study of the purely scientific aspects of the subject.—E. O. J.

#### MINOR NOTICES.

THE PROCEEDINGS of the tenth annual convention of the Association of Agricultural Colleges and Experiment Stations has recently been issued in Bulletin no. 41 of the Office of Experiment Stations. They contain only one botanical paper, a vigorous presentation of the place of vegetable physiology in the curriculum of the agricultural colleges, by Professor Geo. E. Stone, of Amherst, Mass. This article, while addressed to agricultural colleges, is equally applicable to the conditions existing in most of the higher educational institutions in the United States, and deserves a wider reading than its form of publication is likely to bring. The author justly states that "there has been no branch of botany so neglected in our country as the physiology of plants." A very general awakening, however, has been recently experienced. As a pedagogical subject, nevertheless, it is still in a very unsettled condition, and it has been called upon to meet the damaging influence of specialists in other lines of activity, who permit inertia and mistaken notions to influence their attitude toward the new aspirant for position. The following sentences, quoted from the article, are so well said, and so much in need of being said, that they are reproduced here, and it is to be regretted that room is not available for more.

"The necessity of defining a branch like physiology is in itself a reflection on our botanical development, especially when there are so many excellent text-books treating physiology in a distinctly characteristic manner. Nevertheless such misconceptions exist, and I feel justified in calling attention to them. There has never been any question as to what physiology implied among the animal physiologists; neither has there been any among European vegetable physiologists. But right here in our American agricultural institutions we have had professors of botany who did not, and do not today, seem to know exactly what ground this subject covers. One institution that I have in mind has advertised for years a thorough and complete equipment for work in vegetable physiology, and yet this very same institu-

tion has scarcely had a single piece of purely physiological apparatus in its outfit during the whole time. The institution I refer to by no means stands alone in the matter. There are others holding the same conception of physiology. The fact in regard to the matter is that there are still some botanists who insist in calling the study of the structure of a stem or leaf, or the mounting of a slide, etc., physiology.

"Physiology as treated by such eminent physiologists as Foster, Bowditch, Ludwig, DuBois Reymond and others, implies function, and I cannot understand how a botanist can even have looked into the text-books of Vines, Sachs, Pfeffer, Frank, and others, without obtaining a similar conception. Inasmuch as physiological botany concerns itself with function, it is essential that any extensive course in this branch must be preceded by a fairly good course in anatomy and histology. I believe, however, that in every elementary branch of botany the function of the plant should be taken into consideration.

"For a practical course in physiology considerable apparatus is needed. This is generally expensive, and when imported not always satisfactory from the American idea of machinery. Much of the apparatus can be constructed in the laboratory, providing a good set of tools is at hand. Much time is saved by having the apparatus all ready to put together at short notice, and for this purpose it is necessary to have a good stock of glassware on hand, which should be fitted up for the various experiments."

The whole article is as practical and incisive as the few sentences quoted indicate, and merits the attention of botanical teachers.—J. C. A.

WORK ON the North American mosses proceeds steadily from the herbarium of Columbia University. The last paper is "A Revision of the North American Isotheciaceæ and Brachythecia," by A. J. Grout.<sup>4</sup> Of the quality of such work only one who goes over it critically can judge; but one has every reason to accept this as a real contribution to the knowledge of these mosses, and the more since the author had the benefit of the advice and the suggestions of Mrs. E. G. Britton.

Mr. Grout adopts *Entodon* for our species of *Cylindrothecium* and *Platygyrium*, *Pylaisiella* for *Pylaisia*, *Holmgrenia* for *Orthothecium*; removes *Homalothecium* from the Isotheciaceæ; and drops *Isothecium* from the list of North American genera. Various changes are made in the list of species, both as to nomenclature and their presence in this country. Over most of these we breathe a sigh of relief, particularly over those affecting the names recently published by Kindberg and C. Müller. Through these the author cuts a wide swath. Four, only, stand; the list of synonyms contains no less than twenty-seven names by these authors, seventeen by Kindberg and ten

<sup>4</sup> Reprinted as a doctor's thesis from Mem. Torr. Bot. Club 6:131-210. 1897.

by C. Müller and Kindberg, while three are relegated to the doubtful list, and two to the rank of varieties. *Brachythecium asperrimum* holds the record with four Kindbergian names as synonyms! Let the good work go on.—C R. B.

AT THE TIME of the death of Dr. Schröter, December, 1894, the *Pilze* of the *Kryptogamen-Flora von Schliesen* was within three parts of completeness. Part of the manuscript for the remainder was prepared, but about one signature had not been begun. The publishers have now issued one of the remaining parts<sup>5</sup> which carries the work through the *fungi perfecti*, and through eighty-five species of the *fungi imperfecti*, which is all the material the author left in readiness for the press.

The publishers express regret that they have been unable to secure a suitable person to complete the work upon the original lines. They therefore purpose to issue shortly a final part, to contain such species as Schröter had indicated, as shown by his fragmentary notes and the herbarium deposited in the Pflanzenphysiologisches Institut of the University of Breslau. It will also contain a supplement giving Schröter's changes and additions to the preceding parts, and will close with an index to the second volume.—J. C. A.

#### NOTES FOR STUDENTS.

FRIEDRICH OLTMANNS<sup>6</sup> has described the results of a recent study of the swarm spores of certain Phæophyceæ. He claims to have disproved the statements of Berthold,<sup>7</sup> as quoted in the standard texts, that in *Ectocarpus siliculosus* a large zoospore comes to rest, becomes attached to one to four small zoospores, and then fuses with them; also that zoospores from plurilocular sporangia fuse in pairs. The form most fully studied was *E. criniger*, in which unilocular sporangia, if present, were not discovered. The claim is that one is dealing here, not with a primitive condition of sexuality, but rather with infusorians which are eating the algal zoospores. The number of nuclei in the so-called zygote is invariably one greater than the number of chromatophores, and the extra nucleus differs from the others in appearance and staining reactions. The process of digestion of the spores can be followed, and the wastes are ejected as minute balls. These facts point to the infusorial nature of the larger organism. This conclusion does not deny all

<sup>5</sup> SCHRÖTER, J.—*Kryptogamen-Flora von Schliesen*, Dritter Band: Pilze. Zweite Hälfte, vierte Lieferung. 8vo. pp. 385–500. Breslau: J. U. Kern's Verlag. 1897. M 3.20.

<sup>6</sup> Ueber Scheincopulationen bei Ectocarpeen und anderen Algen. *Flora* 83: 398–414. 1897.

<sup>7</sup> Die geschlechtliche Fortpflanzung der eigentlichen Phaeosporen. *Mittb. d. zool. Stat. Neapel* 2: 401. 1897.